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- II. "On the Structure and Development of the *Cysticercus Cellulosæ*, as found in the Pig." By GEORGE RAINEY, Esq., Lecturer, and Demonstrator of Practical and Microscopical Anatomy at St. Thomas's Hospital. Communicated by ROBERT D. THOMSON, M.D., F.R.S. Received February 15, 1856.

The present communication is an enlarged and revised version, illustrated with figures, of a paper by the author, bearing the same title, which was read on the 13th December 1855, and was subsequently, by permission, withdrawn. An abstract will be found in the 'Proceedings' under the date referred to.

- III. A paper was in part read, entitled "On the Dioecious Character of the Rotifera." By PHILIP HENRY GOSSE, Esq. Communicated by THOMAS BELL, Esq., F.R.S., Pres.L.S. Received February 19, 1856.

The Society then adjourned over the Easter holidays, to Thursday, April 3.

April 3, 1856.

Sir PHILIP DE MALPAS GREY EGERTON, Bart., V.P.,
in the Chair.

The reading of Mr. Gosse's paper, "On the Dioecious Character of the Rotifera," was resumed and concluded.

(Abstract.)

Professor Ehrenberg, in his descriptions of this class of animals, assumed them to be in every case hermaphrodite. His conclusions remained unchallenged till 1848, when Mr. Brightwell discovered

the separate sexes of *Asplanchna Brightwellii*. The author of this memoir soon afterwards discovered a second species of the same genus (*A. priodonta*) with a like dicecious character; and more recently Dr. Leydig has added a third (*A. Sieboldii*), which does not differ in this respect from its congeners.

Dr. Leydig plausibly conjectures that *Enteroplea* of Ehrenberg is the male sex of *Hydatina*, that *Notommata granularis* is the male of *N. Brachionus*, and that *Diglena granularis* of Weisse is the male of *D. Catellina*.

The author of the present memoir has ascertained from his own observations that the sexes are separate also in *Brachionus Pala*, *B. rubens*, *B. amphicerus*, *B. angularis*, *B. Bakeri*, *B. Dorcas*, *B. Mülleri*, *Synchaeta tremula*, *Polyarthra platyptera*, *Sacculus viridis*, and *Melicerta ringens*. The males of these species, which are here described in detail, differ so greatly from the females in form, size, and structure, that they could not have been supposed to belong to the same genera, or even families, if their parentage had not been distinctly determined.

One of the most remarkable characters of male Rotifera is the absolute and universal atrophy of the digestive system. No mastax, jaws, œsophagus, stomach, or intestines occur in any example of any species. Another peculiarity is the great disparity between the sexes. In every observed case the male is inferior in size and in organization to the female.

The muscular system is well developed in the males of *Hydatina*, *Asplanchna*, and *Brach. Mülleri*. The frontal cilia are in general greatly developed in this sex, the result of which is seen in the energy and rapidity of its locomotion. In most instances the great occipital ganglion is distinct, with a red eye seated on it; and the latter is almost always present, even where the ganglion cannot be defined. The lateral convoluted threads appear in *Hydatina*, *Asplanchna*, and *Brach. dorcas*; and in *Aspl. Brightwellii* they are accompanied by tremulous tags, and by a contractile bladder.

Irregular masses of opaque substance are almost constantly present in male Rotifera. This substance Dr. Leydig considers a urinary concretion.

In all cases the abdominal cavity is occupied by a capacious sperm-sac, from which spermatozoa are forced out by pressure. The out-

let of the sperm-sac is by a thick, protrusile, and retractile penis. In those species which possess a foot, the intromittent organ is soldered to its dorsal side, and is often so greatly developed that the foot itself appears as an appendage. The penis is protruded by eversion; and is then seen to be a thick column with the extremity truncate and ciliated. The sexual coitus has been witnessed by the author in several instances.

For a parallel to the curious facts thus established, the author considers we must look to the Crustacea. The *Hectocotylus* of certain Mollusca is scarcely an analogous case; nor are those Entozoa in which the males are organically united to the females.

In the Crustacea, however, many examples occur of a sexual difference which may be compared with that of the subjects of this memoir. In the genera *Bopyrus*, *Phryxus*, and *Ione*, the males are notably smaller than the females, very diverse in form, and in some respects inferior in structure. In the *Siphonostoma*, "the males are extremely small, and do not *in the least* resemble the females" (Baird); though those of different genera bear a strong resemblance *inter se*, even where the females are very dissimilar. So low is their grade of organization, that Burmeister has attempted to prove the minute males to be embryonic forms. Finally, in the Cirripedia, Mr. Darwin has proved the existence of males in the genera *Ibla* and *Scalpellum*, which are very minute as compared with their females, excessively abnormal in form, and in some respects in an embryonic condition, though unquestionably mature, as shown by their spermatozoa. And, what is still more interesting, there is, in these male Cirripedia, "no vestige of a mouth, or masticatory organs, or stomach." The same observer describes the internal structure as "a pulpy mass with numerous oil-globules;" and the sperm-vesicle as "a pear-shaped bag at the very bottom of the sack-formed animal containing either pulpy matter, or a great mass of spermatozoa,"—terms which might have been employed in describing some of the male *Brachioni*.

In all these analogies, the author finds additional reasons for assigning to the Rotifera a zoological rank among the Articulata.